Engine Control Systems
a Clean Diesel Technologies Company

Verified Emission Control Products

A World Leader in Clean Air Technology
ENGINE CONTROL SYSTEMS

Engine Control Systems ("ECS") is a leading environmental applications engineering provider and manufacturer of a full range of verified exhaust emissions control solutions. Globally, we offer a full range of products for OEM, aftermarket and retrofit markets for the reduction of exhaust emissions of on-road, off-road and stationary diesel, gasoline and alternative fuel engines including propane and natural gas.

CLEAN DIESEL TECHNOLOGIES, INC.

Clean Diesel Technologies, Inc. (NASDAQ:CDTI) ("CDT") is a vertically integrated global manufacturer and distributor of emissions control systems and products, focused in the heavy-duty diesel and light-duty vehicle markets. As a cleantech company, CDT utilizes its proprietary patented Mixed Phase Catalyst (MPC®) technology, as well as its ARIS® selective catalytic reduction system; Platinum Plus® fuel-borne catalyst, and other technologies to provide high-value sustainable solutions to reduce emissions, increase energy efficiency and lower the carbon intensity of on- and off-road engine applications. CDT is headquartered in California, along with its wholly owned subsidiary, Catalytic Solutions Inc., and currently has operations in the U.S., Canada, U.K., France, Japan and Sweden as well as an Asian joint venture.

For more information, please visit www.cdti.com and www.catalyticsolutions.com.

OUR HISTORY

Engine Control Systems established its roots over 30 years ago, providing custom fit specialized severe-duty applications in mining, cargo handling, and construction. ECS continues to be a pioneer, attaining a large number of verifications in numerous retrofit programs around the world.

Our customers keep coming back to ECS because we continue to develop and design solutions that work. Whether you are a small company with a few applications, or a large fleet operator, you will receive the same high level of service and expertise that you would expect from an industry leader. We will be glad to share our experience to meet your individual emission reduction goals.
OUR MISSION

We will engineer our emissions control products to your specific application and design a robust product package that fits precisely within your packaging envelope. This approach reduces installation and assembly time and optimizes operating uptime.

QUALITY PRODUCTS. EXCEPTIONAL BENEFITS.

Manufactured in ISO 9001 facilities, Engine Control System products are designed to offer ease of installation, peak performance, long life, and a proven history. To ensure your equipment’s uptime, we only use premium grades of stainless steel and welding materials to prevent corrosion and premature failure. Should you require field support, we will be there to support your operation and keep you on the go.

LET US RESOLVE YOUR ENVIRONMENTAL MANDATE REQUIREMENTS

Simply give us a call at 1-800-661-9963 or fill out the Request for Quote and Funding form on our website and experience the difference. We will be happy to discuss your specific requirements and follow up with you quickly with the best solution, related costs and funding availability.
**ACTIFILTER SG**

The Actifilter SG system is a diesel particulate filter (DPF) system that provides 90+% PM reduction on an ongoing basis with automatic in-use filter regeneration that works on even the most challenging duty cycles. This unique system leverages a combination of strong passive DPF regeneration with the low exhaust temperature capability of active DPF regeneration systems to address almost any duty cycles. Our Actifilter SG system is an adaptive system that adjusts to a vehicle’s actual use, and regenerates the DPF when appropriate, but does not waste fuel if not needed. The “intelligent” on-board regeneration ensures low DPF backpressure and peak performance. This system does not require user intervention, off-cycle routines or maintenance or compromise of the vehicle work cycle.

**KEY BENEFITS**

- Autonomous DPF regeneration system
- No operator involvement
- Adaptive to duty cycle
- Does not require special operating conditions or routines
- Keeps filter clean (no clogging) with automatic regenerations when needed
- Prevents backpressure build up
- Universal system for fleets
- Accommodates low exhaust temp / duty cycles without special procedures
- No requirement for tailpipe venturi; low exhaust temperature even during regeneration!
The Actifilter SG system is designed for intra-city medium duty trucks and buses where the passive regeneration of a DPF is impeded by low exhaust temperatures caused by low vehicle speeds and frequent stops. This system has been proven on several applications including urban buses and delivery trucks with thousands of operational hours in use as well as several successive Canadian winters.

**ACTIFILTER SG FOR TRUCKS**

- Features modular packaging to ease installation
- Features adaptive DPF regeneration to keep the filter clean
- Minimizes regenerations to when needed
- Maximizes vehicle up time
- Features regeneration operation during duty cycle
- Eliminates the need to turn on at idle or “plug in” for regeneration to occur
- Requires minimal maintenance requirements on an extended interval basis
- Proven on “stop start” vehicles and very low duty cycles to high duty cycles, such as inner city delivery trucks

**ACTIFILTER SG FOR BUSES**

- Features flexibility of system installation for varied configurations
- Keeps the filter clean under inner city urban bus operation
- Minimizes regenerations to when needed
- Maximizes vehicle up time, minimize maintenance
- Keeps exhaust pipe clean and soot-free with 90% particulate reduction for clean diesel and passenger / driver health
- Eliminates drive cycle constraints so buses can operate on a continuous basis
- Does not require vehicle high idling procedures
- No driver intervention or knowledge required
The Purifilter® Plus system combines the passive operation of our Purifilter® DPF with the active regeneration of our Combifilter® DPF to provide the best benefits of both products. This system employs a passive Purifilter® DPF to allow extended periods of passive operation with periodic active regeneration at an optimal interval determined for your equipment (i.e. weekly, biweekly, every preventative maintenance, etc.) to:

- Increase Purifilter® DPF tolerance of duty cycle variations
- Provide a proactive fleet management / maintenance tool that insures equipment availability, up-time, low backpressure, fuel economy and ease of on-board service without DPF removal
- Reduce infrastructure investment by allowing regeneration equipment to be used to support a wide number of Purifilter® DPF installations
- Truly eliminate the need to remove DPFs, except for de-ashing

The Purifilter® Plus system is the perfect solution for high utilization fleets (i.e. cargo handling at ports) or rental construction fleets. They can find a quick way to ensure the condition of DPFs installed on rental equipment to a wide variety of customers with diverse equipment uses. This technology works where no other DPF technologies can survive!

ECS's Purifilter® Plus system is EPA and ARB verified to work with a variety of model year 1993 thru 2006 heavy duty highway applications including school buses, urban buses, refuse, drayage, delivery and public fleet vehicles.
Purifilter® Passively Regenerating DPF

Our Purifilter® product was the first passively regenerating DPF to attain an industry leading 90% PM emissions reduction credit value.* Purifilter® DPFs are more efficient as they are manufactured with silicon carbide substrates which offer superior filtration and durability compared to other DPF materials. They employ a base and precious metal catalyst impregnated onto the silicon carbide DPF surface to passively oxidize accumulated particulate while complying with stringent U.S. EPA and California Air Resources Board (CARB) limits on NO$_2$ emissions. The bottom line is that your investment in our Purifilter® DPF delivers the most effective, durable and quiet solution to your environmental mandate.

*Current EPA verified technologies PM reduction values are dependent upon the specific engine and application using USLD fuel. Values are subject to change.
VERIFIED DIESEL PARTICULATE FILTERS

COMBIFILTER® ACTIVELY REGENERATING DPF

The Combifilter® product is an actively regenerating DPF system that typically removes 85+ % of PM.* Unlike passively regenerating DPF’s, engines equipped with our Combifilter® products do not have to meet minimum duty cycle requirements. Depending on the Combifilter® DPF you choose, simply plug your equipped vehicle in when you’re on lunch or when the day’s work is done and your equipment will always be ready for a day’s uninterrupted work. The Combifilter® Type S DPF regenerates, or self cleans, in 60 to 90 minutes and the Combifilter® Type K DPF regenerates in eight hours or overnight. Our Combifilter® products offer flexibility, with various systems available for various applications. Engine Control Systems will determine which Combifilter® system is best for your application.

*Current EPA verified technologies PM reduction values are dependent upon the specific engine and application using USLD fuel. Values are subject to change.
AZ Purifier® & Purimuffler®
The Best DOC Solution in the Industry, Period!

AZ Purimuffler® and Purifier® products offer an industry leading, EPA verified 20-40% PM reduction values, depending upon the application. Other manufacturers offer only verified PM reduction values of 20 to 26%*. Our competitors claim to offer similar high levels of PM reduction, but only Engine Control Systems backs it up with actual EPA verification (includes reductions going from LSD to ULSD).

Our AZ Purifier® and Purimuffler® products employ an advanced zeolite-containing washcoat and precious metal catalyst that afford superior low temperature performance. The AZ Purifier® and Purimuffler® products can be combined with the ECS Closed Crankcase Ventilation (CCV) system, which increases verified PM reduction to 40% for all 1991 to 2004 medium and heavy duty highway engine applications compliant to a 5 or 4 g/hp-hr NOx standard (see section on ECS CCV).

With over 1,000 direct fit designs, ECS provides you with the most cost-effective long term solution which you can feel good about. Our Purimuffler® products can be customized to meet your OE muffler’s specifications.

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COMBICLEAN®

The CombiClean® station is an automatic cleaning station used to perform regularly scheduled maintenance on your DPF and ensure its long life and efficiency. The cleaning process is designed to safely and effectively clean the filter and provide for the safe disposal of particulate waste following municipal and environmental guidelines.

BACKPRESSURE MONITOR & LOGGER

The Backpressure Monitor and Logger provides onboard information to the vehicle or equipment user, providing the operator notification of required maintenance of the emission control system. The Backpressure Monitor & Logger also logs information for diagnostic purposes to hasten maintenance and reduce downtime.
In combination with select Engine Control Systems emission control solutions, the closed crankcase ventilation (CCV) system improves the level of particulate matter reduction by eliminating crankcase emissions.

Unlike exhaust emissions, crankcase gases normally escape into the environment through the crankcase vent tube. The ECS CCV system is a truly closed CCV system which effectively eliminates 100% of crankcase emissions at all times and:

- Improves passenger compartment air quality, which is especially important in all bus applications (school, shuttle, urban, etc.) as well as refuse and municipal fleet vehicles
- Improves air quality for personnel working in the vicinity of an operating piece of equipment
- Reduces fouling in the engine compartment of charge air coolers, radiators, etc. increasing their efficiency

CCV systems have been proven by the EPA to reduce pollutants released from crankcases when combined with a diesel oxidation catalyst and can reduce emissions up to 40% and yield the following benefits:

1. Cleaner engine environment
2. Improved vehicle/equipment reliability with less need for maintenance
3. Keeps engine compartment and components cleaner

Engine Control Systems line of CCV systems are EPA approved, helping you not only lower emissions, but lower operating costs as well.
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